Department of Fish and Wildlife

# DESIGN GUIDELINES APPROVED FOR USE IN DESIGNING WATER CROSSINGS OVER FISH-BEARING WATERS IN WASHINGTON STATE

## Code of Federal Regulations, Title 23, Highways[1]

*Notes for appropriate use to comply with WAC 220-660-190*

May 8, 2015

**Location and Hydraulic Design of Encroachments on Flood Plains (**23 CFR 1.650) was cited by FHWA and WSDOT as the design standards for bridge crossings in discussions with WDFW on the content and wording of **Water Crossing Design Guidelines**[2] (WCDG) and WAC 220-660-190. We take this opportunity to emphasize several important statements in this document that help the designer comply with the rule and obtain a Hydraulic Project Approval (HPA). Failure to recognize the importance of fish protection in design will result in conflicts with provisions in WAC 220-660-190.

**§ 650.103 Policy**

650.103(e): the natural floodplain values to be restored and preserved include fish (§ 650.105(i)), but how exactly this is done is unclear at this point. We suggest using the methods in Chapter 4 of the **WCDG** as a guide, or a check, during the design process.

650.103(f): We encourage the bridge owner and designer to avoid support of incompatible floodplain development, although it is not required by rule where "…human-made features in the flood plain that are outside the control of the applicant and they are unlikely to be removed" (WAC 220-660-190(3)b). Cooperation with floodplain planning efforts is encouraged, something that is reiterated in 650.111(f).

**§ 650.111 Location hydraulic studies.**

650.111(c): Environmental impact is among the various factors discussed for evaluating encroachments. 650.111(c) (2) and (5): natural floodplain values are described in detail in the **WCDG** Chapter 4.

[1] Sirofchuck, S. E ed (2011). Code of Federal Regulations, Title 23, Highways. U. S. Office of the Federal Register National Archives and Records Administration, 638 p.

[2] Barnard RJ, Johnson J, Brooks P, Bates KM, Heiner B, Klavas JP, Ponder DC, Smith PD, Powers PD. 2013. Water Crossings Design Guidelines. Washington Department of Fish and Wildlife: Olympia, Washington.

We recommend that a reach analysis be performed for every bridge design (**WDCG** Chapter 4) and that the level of effort commensurate with the complexity and risks of the project. This sort of analysis will reveal the stream functions and processes that form and support fish habitat and the ways that the designer can avoid or minimize impacts, particularly those associated with encroachment. Encroachment is also addressed in the step-wise design process described in Chapter 4 *Selection of Bridge Length*. In this section, and in WAC 220-660-190(4)(c), the velocity ratio is proposed as a check for the designer to evaluate encroachment. We recommend that the HPA applicant report the velocity ratio along with their design when there is wide, functional floodplain at the crossing.

**§ 650.115 Design standards.**

650.115(a): WDFW encourages alternative analysis to clearly show the costs and benefits across a range of actions. We suggest that the permitting biologist be involved early in this evaluation to make sure that the final project is acceptable under WAC 220-660-190. The "environmental concerns" are not specified here. In Washington State, these concerns would include, among other things, fish and their habitat, which are protected by law (RCW 77.55) and code (WAC 220-660).

650.115(a)(3): WAC 220-660-190(4) (f) states that

> "The design must have at least three feet of clearance between the bottom of the bridge structure and the water surface at the 100-year peak flow unless engineering justification shows a lower clearance will allow the free passage of anticipated debris."